Schlumberger

ReSOLVE Service's Milling Tool Removes 4,650 ft of Barium Sulfate Scale in 81 h

MillOptimizer automatic milling system seamlessly integrates milling tool and UltraTRAC tractor for optimized WOB, offshore Norway

CHALLENGE

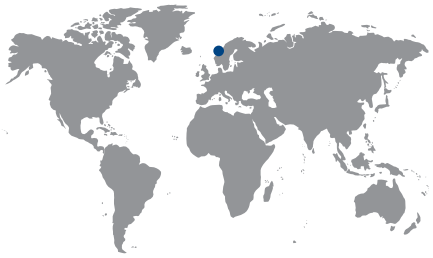
Efficiently remove extensive accumulation of barium sulfate scale to enable conveying an isolation sleeve through the production tubing into position.

SOLUTION

Run ReSOLVE* instrumented wireline intervention service's milling tool with custom PDC bit designed by Lyng Drilling, a Schlumberger company, and powered by the UltraTRAC* all-terrain wireline tractor, operating in coordination through the MillOptimizer* automatic milling system adjusting the weight on bit (WOB) to optimize torque and monitored with real-time measurements.

RESULTS

Powered through 4,650 ft of barium sulfate scale at an average speed of 57 ft/h to complete the job in a quick 81 operating hours.

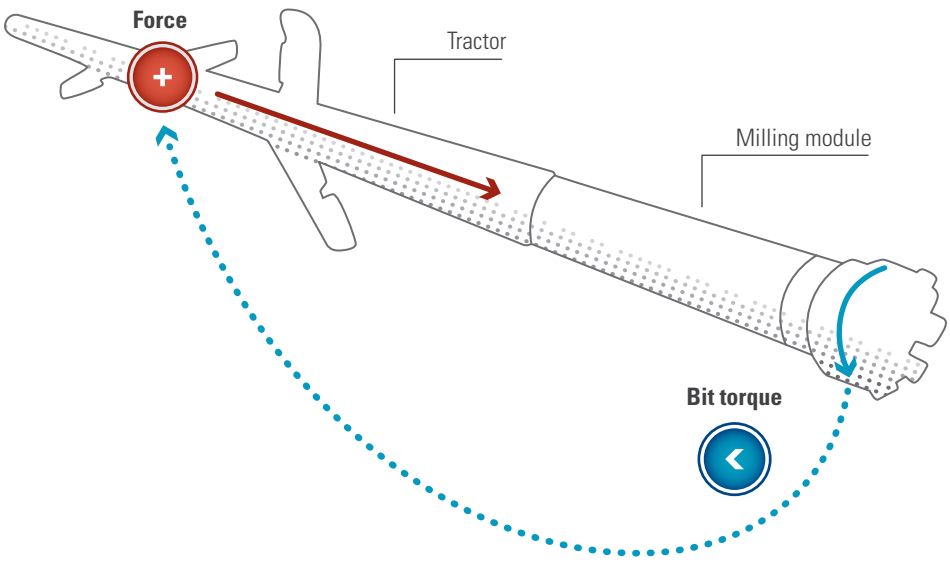


Thousands of feet of scale

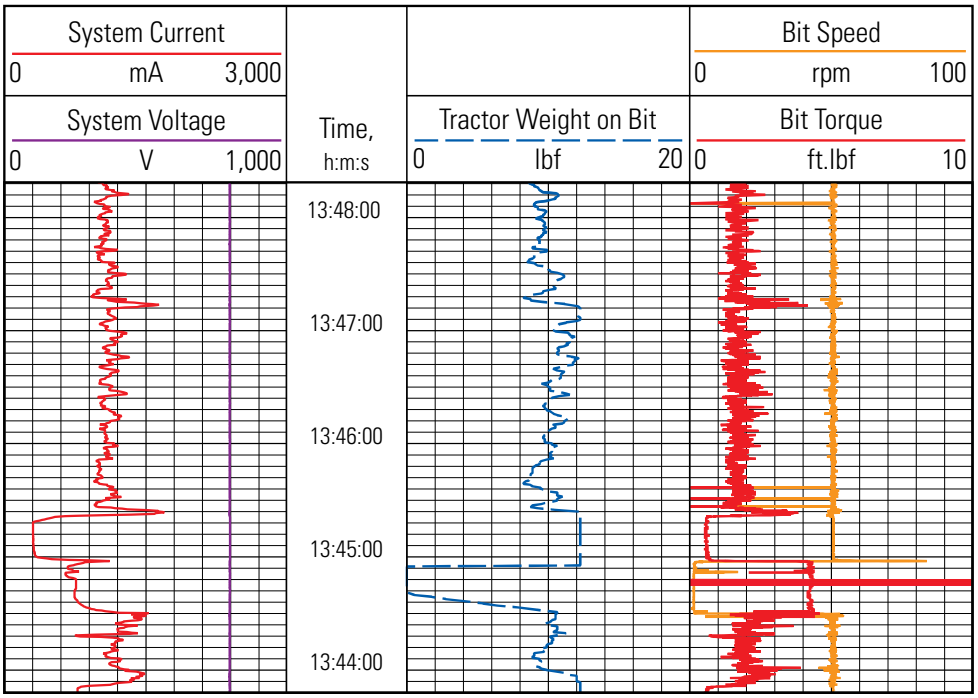
The operator of a well offshore Norway needed to repair a leak in the tubing by installing an isolation sleeve, but thousands of feet of scale accumulation prevented conveying the sleeve into position.

Measured confirmation of milling

ReSOLVE instrumented wireline intervention service in milling tool configuration uses a Lyng Drilling custom-designed PDC bit that is optimized for maximum rate of penetration (ROP) when milling hard scale buildup in tubulars. The milling tool also incorporates the innovative MillOptimizer automatic milling system to automatically coordinate operation with an UltraTRAC all-terrain wireline tractor. The UltraTRAC tractor is used to drive ReSOLVE service forward and resist rotation while the milling tool's rotating bit engages the obstruction. The MillOptimizer system leverages the instrumentation of the two tools so that they operate as a single intelligent system. The engineer sets the bit speed and desired bit torque. The operating milling tool communicates the bit torque to the tractor in real time, and the tractor continuously adjusts the applied WOB to keep the system milling at the desired torque. This intercommunication enables the tools to automatically respond to variations in the amount of scale by adjusting the pushing force as necessary to keep the system operating without stalling. If bit stalling does occur, it is immediately detected by the MillOptimizer system, which automatically stops the tool, disengages the scale by reversing the bit and the tractor, and then resumes milling.



The MillOptimizer automatic milling system for the ReSOLVE service's milling tool delivers the world's first truly robotic intervention system.



The ReSOLVE service's log documents the precision of the MillOptimizer system in automating a milling operation.

4,650 ft of scale milled in 81 operating hours

A total of 4,650 ft of barium sulfate scale was milled at an average of 57 ft/h on the first job worldwide for the ReSOLVE service's milling tool. The MillOptimizer system was used extensively to automatically adjust the force provided by the UltraTRAC tractor and automatically recover from any bit stalls. This seamless integration made operations much more efficient than using a conventional uninstrumented milling tool and protected the tool and bit from damage where variability in the scale accumulation caused frequent, sudden increases in torque. The automatic control provided by the MillOptimizer system enabled milling at speeds that were much higher than average, resulting in quicker job completion with fewer trips out of the well.

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